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C. Amendment to the Claims

This listing of claims will replace all prior versions, and listings, of claims in this application.

Listing of Claims

1 - 65. (canceled)

66. (previously presented) A vehicle monitoring system that monitors the state of a plurality of vehicles, said system comprising:

at least one mobile data unit that generates automatic status information corresponding to a delivery vehicle, wherein the automatic status information includes position information and delivery state information;

a delivery state database that store the automatic status information generated by the mobile data unit;

wherein the mobile data unit includes a controller, a GPS receiver coupled to the controller, and at least one vehicle condition sensor coupled to the controller, and said controller generates the automatic status information based on signals received from the GPS receiver and the vehicle condition sensor;

wherein the controller determines the delivery state information based on the signal received from the vehicle condition sensor; and

wherein the vehicle condition sensor generates a mixing barrel status signal indicative of a charge operation condition and a discharge operation condition of a mixing barrel, and wherein the controller determines a Begin Pour delivery state and an End Pour delivery state based on the mixing barrel status signal.

67. (previously presented) A vehicle monitoring system as claimed in claim 66, further comprising dispatch monitoring means for accessing the automatic status information stored in the delivery state database and displaying the automatic status information to provide a visual indication of the identity of the delivery vehicle, the position of the delivery vehicle and the delivery state of the delivery vehicle.

68. (previously presented) A vehicle monitoring system as claimed in claim 67, wherein the dispatch monitoring means displays the automatic status information on a display monitor in the form of an icon, wherein a display condition of the icon is varied in accordance with a delivery state defined by the delivery state information.

69. (previously presented) A vehicle monitoring system as claimed in claim 68, wherein the display condition includes at least one of the shape, color, size, contrast or display status of the icon.

70. (previously presented) A vehicle monitoring system as claimed in claim 66, wherein the delivery state information includes a plurality of delivery states that define a delivery cycle, and wherein the controller determines whether a current delivery state is valid based on the delivery cycle.

71. (previously presented) A vehicle monitoring system as claimed in claim 70, wherein the controller determines whether a current delivery state is valid based on whether a prerequisite delivery state within the delivery cycle has occurred.

72. (previously presented) A vehicle monitoring system as claimed in claim 66, wherein the mobile data unit includes a wireless transmitter/receiver that transmits the automatic status information from the mobile data unit to the delivery state database via a wireless transmission device coupled to the delivery state database.

73. (previously presented) A vehicle monitoring system as claimed in claim 72, further comprising:

a dispatch monitoring means for accessing the automatic status information stored in the delivery state database and displaying the automatic status information to provide a visual indication of the identity of the delivery vehicle, the position of the delivery vehicle and the delivery state of the delivery vehicle; and

wherein the dispatch monitoring means includes data entry means for entering

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messages that are transmitted to the mobile data unit via the wireless transmission device and the wireless transmitter/receiver.

74. (previously presented) A vehicle monitoring system as claimed in claim 73, wherein the mobile data unit includes a display unit that displays the messages transmitted to the mobile data unit from the dispatch monitoring means.

75. (previously presented) A vehicle monitoring system as claimed in claim 74, wherein the mobile data unit includes data entry means for entering messages that are transmitted to the dispatch monitoring means via the wireless transmitter/receiver and the wireless transmission device.

76. (previously presented) A vehicle monitoring system as claimed in claim 75, wherein the messages transmitted to the dispatch monitoring means from the mobile data unit and to the mobile data unit from the dispatch monitoring means are transmitted in the form of cellular digital packet data.

77. (previously presented) A vehicle monitoring system as claimed in claim 72, wherein the automatic status information is automatically transmitted to the delivery status database when a change in delivery state information occurs.

78. (previously presented) A vehicle monitoring system as claimed in claim 66, wherein hot zone data corresponding to geographic zone around at least one of a loading terminal and a delivery site is supplied to the mobile data unit, and wherein the controller determines the delivery state information based on the hot zone data.

79. (previously presented) A vehicle monitoring system as claimed in claim 78, wherein the controller alters the hot zone data in response to certain delivery states defined by the delivery state information.

80. (previously presented) A vehicle monitoring system as claimed in claim 79, wherein the controller alters the hot zone data to expand the geographic zone when the delivery state information is indicative of an At Job delivery state to thereby avoid problems associated with GPS jitter.

81. (previously presented) A vehicle monitoring system as claimed in claim 79, wherein the controller alters the hot zone data to relocate the geographic zone when the delivery state information is indicative of a change in location of a delivery site.

82. (previously presented) A vehicle monitoring system as claimed in claim 78, wherein the controller disables position detection when the delivery vehicle enters a geographic zone defined by the hot zone data to avoid problems associated with GPS jitter.

83. (previously presented) A vehicle monitoring system as claimed in claim 66, wherein a vehicle condition sensor is provided that generates a vehicle velocity signal, and at least one of the Begin Pour delivery state and the End Pour delivery state is determined by the controller based on the mixing barrel status signal and the vehicle velocity signal.

84. (previously presented) A vehicle monitoring system as claimed in claim 83, wherein the controller determines if the End Pour delivery state is valid if: a) a valid At Job state has been determined; b) a valid Begin Pour state has been determined; c) the mixing drum status signal indicates a charge condition; and d) at least one of the following conditions is true: 1) the signal received from the GPS receiver indicates the delivery vehicle is outside of a specified hot zone; or 2) the velocity signal indicates delivery vehicle is moving at a velocity greater than a predetermined minimal threshold.

85. (previously presented) A vehicle monitoring system as claimed in claim 83, wherein the controller determines if the Begin Pour delivery state is valid if: 1) the velocity signal indicates the delivery vehicle is moving at a velocity less than a predetermined threshold value; and 2) the mixing drum status signal indicates a discharge

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condition.

86. (previously presented) A vehicle monitoring system as claimed in claim 85, wherein the controller further determines if the Begin Pour delivery state is valid if at least one of: a) a valid At Job state is determined; and b) the signal received from the GPS receiver indicates the delivery vehicle is outside of a hot zone corresponding to a loading terminal.

87. (previously presented) A method of providing automatic status information for a plurality of delivery vehicles, wherein the automatic status information includes position information and delivery state information, said method comprising:

determining position information corresponding to each of the delivery vehicles using a GPS data;

determining delivery state information corresponding to each of the delivery vehicles using at least one vehicle condition sensor provided on each of the delivery vehicles;

transmitting the position information and delivery state information to a delivery state database via a wireless transmission network; and

defining a plurality of delivery states corresponding to a delivery cycle, wherein the delivery state information comprises the delivery states;

wherein the validity of a current delivery state is determined based on whether a prerequisite delivery state has occurred; and

wherein the delivery states include a Begin Pour delivery state and an End Pour delivery state associated with the delivery of ready-mix concrete.

88. (previously presented) A system for tracking the state of a plurality of vehicles, said system comprising:

a mobile unit to generate information regarding status of a delivery vehicle among said plurality of vehicles, including current position and delivery state of said delivery vehicle;

a delivery state database that stores the generated status information;

said mobile unit coupled for GPS reception, with one or more sensors adapted to supply vehicle event information thereto; to enable the mobile unit to determine delivery state of the delivery vehicle and to generate said status information therefrom;

said vehicle event information indicative of plural delivery states in a sequence of events in which said delivery vehicle may engage, and said mobile unit responsive thereto to determine beginning and ending delivery states in a subset of said sequence of events.

89. (previously presented) The vehicle tracking system of claim 88, further comprising dispatch monitoring apparatus to access status information stored in said delivery state database for display thereof to visually indicate the identity, position and delivery state of the delivery vehicle for which said status information was accessed.

90. (previously presented) The vehicle tracking system of claim 89, wherein the dispatch monitoring apparatus displays the status information in a form adapted to undergo varied display according to the delivery state defined by the accessed status information.

91. (previously presented) The vehicle tracking system of claim 90, wherein said form of the displayed status information includes one of shape, color, size, contrast or display status.

92. (previously presented) The vehicle tracking system of claim 88, wherein the delivery state is one or more of a plurality of delivery states that define said sequence of events, and wherein the mobile unit ascertains the validity of a current delivery state based on said sequence.

93. (previously presented) The vehicle tracking system of claim 92, wherein the mobile unit ascertains the validity of a current delivery state according to whether a certain delivery state within said sequence of events has occurred as a condition precedent to said current state.

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94. (previously presented) The vehicle tracking system of claim 88, wherein the mobile unit interacts with a wireless transmitter/receiver to transmit the status information to the delivery state database via a wireless transmission medium.

95. (previously presented) The vehicle tracking system of claim 94, further comprising:

dispatch monitoring apparatus for accessing and displaying the stored status information to visually indicate the identity, the position, and the delivery state of the delivery vehicle; the dispatch monitoring apparatus including data entry means for entering messages to be transmitted to the mobile unit via the wireless transmission medium.

96. (previously presented) The vehicle tracking system of claim 95, wherein the mobile unit includes a display for messages transmitted from the dispatch monitoring apparatus.

97. (previously presented) The vehicle tracking system of claim 96, wherein the mobile unit includes data entry for entering messages transmitted to the dispatch monitoring apparatus.

98. (previously presented) The vehicle tracking system of claim 97, wherein the messages transmitted to and from the dispatch monitoring apparatus from and to the mobile unit are transmitted in the form of digital packet data.

99. (previously presented) The vehicle tracking system of claim 94, wherein status information is transmitted to the delivery status database in response to a change in delivery state.

100. (previously presented) The vehicle tracking system of claim 88, wherein data corresponding to a preselected geographic zone around one of a loading terminal and a delivery site is supplied to the mobile unit for use in determining the delivery state.

101. (previously presented) The vehicle tracking system of claim 100, wherein the mobile unit is adapted to alter the geographic zone data in response to certain predefined delivery states.

102. (previously presented) The vehicle tracking system of claim 101, wherein the mobile unit is adapted to alter data to expand the geographic zone when the delivery state is indicative that the delivery vehicle is at the job site, so as to avoid effects of GPS jitter.

103. (previously presented) The vehicle tracking system of claim 101, wherein the mobile unit is adapted to alter data corresponding to the geographic zone for the job site when the delivery state of the delivery vehicle indicates a change in location of the job site.

104. (previously presented) The vehicle tracking system of claim 100, wherein the mobile unit is adapted to disable position detection when the delivery vehicle enters the geographic zone, so as to avoid effects of GPS jitter.

105. (previously presented) The vehicle tracking system of claim 88, wherein the delivery vehicle is a ready mix slurry transport vehicle having a mixer drum, one of said vehicle event sensors generates a vehicle velocity signal, and a delivery state indicative of a Begin Pour or an End Pour of slurry from the mixer drum is determined by the mobile unit according to a mixer drum status signal and the vehicle velocity signal.

106. (previously presented) The vehicle tracking system of claim 105, wherein the mobile unit confirms the validity of the End Pour delivery state if: a) a valid At Job state has been determined; b) a valid Begin Pour state has been determined; c) the mixer drum status signal indicates a charge condition; and d) at least one of the following conditions is true: 1) the GPS reception indicates the delivery vehicle is outside a specified geographic zone; or 2) the vehicle velocity signal indicates a velocity greater than a predetermined minimum threshold.

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107. (previously presented) The vehicle tracking system of claim 105, wherein the mobile unit confirms the validity of a Begin Pour delivery state if: 1) the vehicle velocity signal indicates a velocity less than a predetermined threshold value; and 2) the mixer drum status signal indicates a slurry discharge condition.

108. (previously presented) The vehicle tracking system of claim 107, wherein the mobile unit additionally confirms validity of the Begin Pour delivery state if at least one of: a) a valid At Job state is determined; and b) the GPS reception indicates the delivery vehicle is outside a geographic zone corresponding to a loading terminal.

109. (previously presented) A method of providing automatic status information, including position information and delivery state information, for a plurality of ready-mix concrete delivery vehicles, said method comprising:

determining position information corresponding to each of the delivery vehicles using GPS data;

determining delivery state information corresponding to each of the delivery vehicles using at least one vehicle status sensor provided on each of the delivery vehicles;

transmitting the position information and delivery state information to a delivery state database via a wireless transmission network; and

defining a plurality of delivery states, including a Begin Pour delivery state and an End Pour delivery state, corresponding to a delivery sequence for ready mix concrete, said delivery states corresponding to respective delivery state information; wherein the validity of a current delivery state is determined at least in part according to whether a preceding delivery state in said sequence has occurred.

110. (currently amended) A system for automated reporting of status of a ready mix concrete or other slurry material mixer truck, including state of events related to the usage, function, operation, location, delivery, systems or cargo of the truck, to a management office for system users including dispatchers and managers using a wireless network, the automated reporting system comprising, on board the truck:

a GPS receiver for receiving GPS signals and for determining position information,

a plurality of sensors for automatically detecting or measuring the current status of parameters corresponding to various selected ones of said events, and

computer apparatus for receiving inputs from the GPS receiver and said plurality of sensors indicative of the respective detected or measured status of parameters of selected events of interest, and for determining therefrom and transmitting to the management office over the wireless network, the state of the selected events of interest and location information in the form of digital data.

111. (previously presented) The automated reporting system of claim 110, including an off-truck database that stores map data with preselected geographic zones identifying sites designated to correspond to plant and job locations of interest, and wherein said computer apparatus has access to said database map data for determining and indicating when the truck is within or outside a preselected geographic zone corresponding to a site location designated by dispatch instructions to the truck over the wireless network.

112. (previously presented) The automated reporting system of claim 111, wherein said dispatch instructions reference a geographic zone corresponding to a site location where the truck is to perform one or more specified operations, and said computer apparatus stores the referenced site and detects and reports arrival and departure of the truck relative to each stored site.

113. (previously presented) The automated reporting system of claim 110, wherein said computer apparatus determines if the truck has deviated from operations designated in received dispatch instructions, and transmits a corresponding exceptions report to the management office.

114. (previously presented) The automated reporting system of claim 111, wherein said computer apparatus issues exceptions reports to the management office for truck deviations in performing events or the sequence of events dictated by dispatch instructions from said office.